June 22, 2011

csi
cellular specialties, inc.

Re: Response to Notice of Proposed Rulemaking (NPRM) for Amendment of the Commission's rules to improve wireless coverage through the use of Signal Boosters. WT-Docket No. 10.4

About Cellular Specialties Inc

Cellular Specialties Inc (CSI) specializes in the design, development and installation of carrier grade fixed and mobile signal boosters for both CMRS and Public Safety applications. CSI has over 14 years of Signal Booster experience. CSI has deployed over 30,0000 boosters and spent millions of dollars on research and development of technologies required to meet the wireless licensees network quality of service. CSI has worked very closely with major wireless carriers to assure that the Signal Boosters meet all of their stringent requirements. This includes the development of sophisticated techniques for specific wireless carrier requirements and validation of performance to their test specifications.

General Summary

CSI agrees with the commission that both mobile and fixed signal boosters require proper design and safeguards to guarantee that their operation does not impact the licensee network, other licensees networks or Public Safety operation. Any changes to the existing rules must be done so as to preserve the networks quality of service. Currently, wireless licensees require that all signal boosters installed in their network are carrier certified, meeting a very stringent and specific set of criteria beyond the current FCC set of regulations. Additionally they require that any signal booster installed in their network must have their approval and installation must be performed by a certified installer.

Response to NPRM

CSI recommends that all signal boosters are certified to ensure that they will operate properly within each carrier's network. The type of certification and who is responsible for certification should be dependent on the type of equipment, signal technology to be amplified and venue the equipment is to be installed in. Additionally for any public venue larger than a Small Office/Home Office (SOHO) installation should be done by only a certified installer.

1. For Carrier based applications, certification should be at the discretion of the Carrier. Any conformance testing above and beyond standard FCC type testing should be determined by the carrier. The technologies used, power levels and network protection algorithms should be left to the carrier to specify and validate since each technology may have different performance requirement. In addition, the spectrum roadmap and evolution of the technology may dictate certain features or performance requirements for the designated pass band. Licensed installers should be used for these applications.

2. For non-Carrier specific applications for medium and large venues, certification above standard FCC type testing should be required. This could be done by an independent test facility, similar to current FCC type testing. If the same equipment to be used has already been certified by the repeated wireless carriers then no additional testing should be required. The certification test criteria should be determined by a standards board made up of a cross section of the licensees and equipment manufacturers. Licensed installers should be used for these applications.

3. For SOHO applications certification above standard FCC type testing should be required and enforced. This could be done by an independent test facility, similar to current FCC type testing.

The certification test criteria should be determined by a standards board made up of a cross section of the licensees and equipment manufacturers. Boosters in this class should have provisions to protect the network integrity should a problem occur (interference, oscillation, etc) as well as the ability to notify the licensee and be remotely shut down by the licensee should a problem persist. These boosters should be registered with the licensee. Installation could be done by the consumer with adequate written instruction.

Response to Section A.1. Problems Encountered with Signal Boosters

The NPRM outlines several potential issues if signal boosters are not properly designed including:

- Adjacent band noise
- Oscillation
- Basestation Input Overload

The commission suggests specific design criteria for signal boosters to mitigate each of these issues. Each of these can be overcome, but it requires more than just proper design. Any system, no matter how well designed, can still have these issues if not properly installed, monitored or maintained.

Adjacent Band Noise (Near-Far Problem)

Improperly designed or installed signal boosters will exhibit high levels of noise outside of the intended licensee band. An operator within the band will have good quality of service while unknowingly impacting adjacent licensee bands. To eliminate this problem proper band pass filtering, whether analog or in combination with digital, is required. This needs to be done on a sub-band basis – only allowing the licensees spectrum to pass. Narrow band (Class A) or Wideband (Class B) must be defined such that the pass band of the filter does not exceed the licensee's band. Filter roll off characteristics are always defined by the carrier for the specific technology employed, i.e. GSM, CDMA, EVDO, UMTS, WiMAX, LTE.By specifically defining roll off requirements, booster manufacturers can effectively provide optimum rejection and overall performance.

Oscillation

Signal boosters, even well designed ones can experience oscillation. To minimize the occurrence of oscillation the signal booster must be properly installed. Proper antenna placement and quality of cables and other materials are a must.

Even if properly installed, oscillation can occur due to dynamic changes in the environment. When oscillation does occur the signal booster must detect the oscillation and take proper precautions to not impact network quality. This would include the ability to determine an oscillation from a transient event, the ability to lower gain and the ability to shut off if the problem cannot be self corrected. The specific algorithm to be used when an oscillation event occurs should be network dependent. If and how often Signal Boosters retry to determine if the oscillation event has passed, should be defined by the wireless carrier. For Public Safety applications, the Signal booster should do all it can to remain on and retry often (10's of seconds) for some commercial applications retries every 12 or 24 hours may be applicable. For Public Safety applications, the Signal booster should do all it can to remain on and retry often (10's of seconds) for some commercial applications retries every 12 or 24 hours may be applicable. In all cases, the licensee must be notified that they have a network issue and allow them to take action remotely if necessary. The need for remote monitoring and control of signal boosters is required. It is not reasonable to expect an owner to take proper independent action or without monitoring and control a licensee to be able to determine exactly which Signal booster is causing the problem.

Basestation Input Overload

As mentioned in paragraph 17 of section one. Installation of fixed signal boosters must be coordinated with the carrier. Additionally, a properly designed signal booster will automatically control gain (AGC) as power levels of in-band handset increases and have proper filtering as to not allow an out of band handset to impact the intended licensees network.

For mobile signal boosters, proper power control is a must. The mobile signal booster should be designed to monitor basestation downlink power levels and turn off if the base station levels exceed a predetermined threshold.

Response to Section B.2 General Requirements For All Consumer Signal Boosters

Paragraph 35:

Signal Boosters should not be limited to 5 watts. There are applications where 5 watt or higher power levels make economic sense. Properly designed signal boosters that meets the out of band noise and emission levels, is properly installed and coordinated with the licensee, should be allowed. These boosters should not be subject to the consumer grade requirement.

Paragraph 37 and 38

CSI agrees that signal boosters should self monitor for compliance of technical requirements and oscillation. However the algorithms proposed may not be sufficient for all applications and should be defined by the licensee not by a standard. Robust algorithms are needed to determine when to adjust gain, shut off and retry. The specifics of how to do this, including timing should be at the discretion of the network owner. Additionally under circumstance where a Signal booster is out of compliance (e.g. device failure or oscillation) the licensee should be notified and have the option of locally or remotely disabling the device.

Response to Appendix A Proposed Rules

Subpart M Paragraph 95.1623 Interference Safeguards

CSI agrees that signal boosters should self monitor for compliance of technical requirements and oscillation. However the algorithms proposed may not be sufficient for all applications. The goal should be to not impact the licensees or other networks including loss of service unless absolutely necessary. Robust algorithms are needed to determine when to adjust gain, shut off and retry. Additionally under circumstances where a Signal booster is out of compliance the licensee should be notified and have the option of locally or remotely disabling the device.

Closing Summary

CSI manufactures signal boosters that have been fully tested and approved by wireless carriers for operation within their networks. These units have been designed with analog and digital filters that meet the strict out of band noise and emissions requirements. Signal processing algorithms to eliminate issues due to oscillation or signal level overload have been implemented that allow for graceful correction. Each signal booster has the ability to be remotely monitored and controlled, including remote shut off. Additionally each unit is installed by a certified installer and only with the consent of the licensee.

Of the several thousand installed CSI signal boosters there have been few interference problems. For problems that did occur, the units either self corrected or notified the maintainer of the issue. It was then quickly corrected.

If the commission determines that a standardized set of requirements is needed then a standards committee with representatives from the carriers and manufacturers should be formed. Methods of measurement for each specific criteria must be developed before any specific parameter can be set. A cross section of representatives would guarantee that the specifications are not such that it favors any one manufacturer or carrier.

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